

TECHNICAL MANUAL

**GENERAL PROCEDURES
HANDLING OF H-70
(HYDRAZINE - WATER FUEL)**

(ATOS)

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Prepared By: Digital Data Support Group

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INTRODUCTION

1. PURPOSE.

The general instructions for handling of a special fuel H-70 will be covered in this Technical Order (T.O.). The fuel H-70 is composed of 70% hydrazine and 30% water by weight. This T.O. provides general information and guidance on methods of handling H-70 safely. It will also cover the standards and procedures for drum handling, spill management, and quality control for this fuel. One example of where this special fuel is used currently is in the Emergency Power Unit (EPU) of the F-16 aircraft.

2. SCOPE.

General instructions and requirements for handling H-70 in this T.O. apply to the following:

- a. The storage, handling, and use of H-70 drums.
- b. The control and cleanup of H-70 spills occurring during storage, handling, use, and/or transportation

will be covered in this T.O. The exception to this is spills occurring around F-16 aircraft. They are managed in accordance with T.O. 1F-16A-2-49-GS-00-1.

- c. Requalification of defueled or otherwise suspect H-70.

3. RESPONSIBILITIES.

The Air Force Petroleum Office, Det 3, WR-ALC/AFTT is responsible for maintaining this document. Where provisions of this T.O. conflict with provisions contained in fuel and equipment manuals, the provisions in this T.O. will take precedence except as noted in this manual. Conditions or circumstances which prevent conformance to this technical order and cannot be resolved locally shall be reported. T.O. 00-5-1 outlines procedures for recommending changes to technical orders.

SAFETY SUMMARY

1. WARNING AND CAUTION STATEMENTS.

WARNING and CAUTION statements have been strategically placed throughout this text prior to operating or maintenance procedures, practices or conditions considered essential to the protection of personnel (WARNING) or equipment and property (CAUTION). A WARNING and CAUTION will apply each time the related step is repeated. Prior to starting any task, the WARNINGS or CAUTIONS included in the text for the task will be reviewed and understood.

2. DEFINITIONS.

The following definitions apply to WARNINGS, CAUTIONS, and NOTES found throughout this publication.

WARNING

Highlights an operation or maintenance procedure, practice, statement, etc., which, if not strictly observed could result in injury, long-term health hazard, or death to personnel.

CAUTION

Highlights an operation or maintenance procedure, practice, statement, etc., which, if not strictly observed, could result in damage or destruction to equipment or loss of mission effectiveness.

NOTE

Highlights an essential operating or maintenance procedure, condition, or statement.

3. GENERAL PRECAUTIONS.

The following are general safety precautions that are not related to any specific procedures and therefore do not appear elsewhere in this technical manual. These are general safety precautions and instructions that people must understand and apply during many phases of operation and maintenance to ensure personal safety and health and the protection of Air Force property.

4. FINGER RINGS/JEWELRY.

Finger rings have caused many serious injuries. Remove rings, watches, and other metallic objects which may cause shock or burn hazards. Unless specifically allowed by shop

safety procedures, remove finger rings during all maintenance activity.

5. COMPRESSED AIR.

Use of compressed air can create an environment of propelled particles. Do not direct air streams towards self or other personnel. Air pressure shall be reduced to less than 30 psig and used with effective chip guarding and personal protective equipment.

6. DANGEROUS PRESSURE.

Care must be taken during testing to ensure that all test connections are proper and tight. All system components must be compatible with pressure applied. Personnel must be protected by a safety shield or located at a distance sufficient to prevent injury.

7. PERSONAL PROTECTIVE EQUIPMENT (PPE).

If unique local conditions make compliance with the protective clothing or other occupational health requirements specified in this manual unnecessary or impractical, obtain an evaluation of the operation from the Bio-Environmental Engineer. The Bio-Environmental Engineer and Base Safety Office will determine the required precautions.

8. CLEANERS/CHEMICALS.

Some cleaners and chemicals have adverse effects on skin, eyes, and the respiratory tract. Observe manufacturers' WARNING labels; Material Safety Data Sheets (MSDS) instructions for proper handling, storage, and disposal; and current safety directives. Use only in authorized areas. Unless otherwise indicated in the text, use as described in this T.O. should not result in any immediate health concerns. Consult the local Bio-Environmental Engineer and Base Safety Office for specific protection equipment and ventilation requirements.

9. SAFETY AND HEALTH.

Workers performing the tasks described in this technical order shall be provided supervisory training on occupational exposure to hydrazine at least annually. This training shall be based on the information contained in Air Force Occupational Safety and Health Standard (AFOSH STD) 48-8, Controlling Exposures to Hazardous Chemical, Attachment 8, Occupational Exposure to Hydrazine.

CHAPTER 1

GENERAL DESCRIPTION OF H-70

1.1 DESCRIPTION.

The propellant H-70 appears as a colorless clear liquid with a slight ammoniacal odor. All procured H-70 used by the Air Force must meet all specifications called out in MIL-PRF-87930.

1.2 CHEMICAL NATURE.

WARNING

- Personnel must wear proper protective equipment and observe all safety precautions as directed when in contact with H-70 propellant. H-70 is a highly toxic, corrosive, and combustible material. Failure to comply may result in EYE or bodily injury and severe burns or even death.
 - Personnel must wear respiratory protection when there is a possibility of coming in contact with H-70 vapor fumes. A short exposure to extremely high concentrations of the hydrazine vapors from H-70 may result in severe irritation to the skin and respiratory system. Long-term overexposures to levels slightly greater than the Permissible Exposure Level (PEL) may result in kidney or liver damage. The hydrazine component of H-70 is also a suspect human carcinogen.
- a. Reactivity – H-70 is a caustic, corrosive solution of hydrazine (70% by wt) and water (30% by wt). The hydrazine component is a powerful reducing agent and will react with carbon dioxide and oxygen in air. Thus, some loss of hydrazine will occur if it is stored under conditions which permit contact with air. Some metal oxides and salts will also decompose hydrazine. Rust, for example, will cause this effect. Depending on the conditions and the contaminating agent, all or some of the following may be formed when hydrazine is decomposed: nitrogen, ammonia, hydrogen, and water. Under certain catalytic or high energy conditions, hydrazine vapor can explode due to auto-decomposition. However, the explosive hazard is reduced by water vapor and nitrogen gas which are present in the vapor space of the H-70 storage drum.
 - b. Solubility – H-70 is soluble in water and low molecular weight alcohols.

1.3 PHYSICAL PROPERTIES.

The H-70 propellant should meet the physical properties identified in [Table 1-1](#).

1.4 FIRE HAZARD.

H-70 has a flash point of approximately 68°C (154°F) and is therefore considered a Class IIIA combustible liquid in terms of regulation DOD 4145.19-R-1.

1.5 MATERIALS OF CONSTRUCTION.

The materials listed below are classified as generally satisfactory for use in contact with H-70. However, there may be exceptions for certain applications.

- a. Stainless Steel – Types 304 and 347
- b. Polytetrafluoroethylene
- c. Polyethylene
- d. Glass

1.6 RESPIRATORY PROTECTION.

Personnel are required to use respiratory protection while performing some tasks when working with H-70 propellant. The respiratory protection will be worn and used in accordance with AFOSH STD 48-137 and AFOSH STD 48-8.

1.7 REFERENCE DOCUMENTS.

Technicians working with H-70 propellant should have the following references available and be familiar with the items covered in them concerning hydrazine.

- a. A-A-52047, Tubing Nonmetallic (rubber and plastic)
- b. AFDIR 37-135, Air Force Address Directory
- c. AFMAN 32-4004, Emergency Response Operations
- d. AFMAN 91-201, Explosive Safety Standards
- e. AFOSH STD 48-137, Respiratory Protection Program
- f. AFOSH STD 48-87, Controlling Exposures to Hazardous Materials
- g. AFOSH STD 91-38, Hydrocarbon Fuels – General
- h. AFOSH STD 91-501, Air Force Consolidated Occupational Safety Standard

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- i. ASTM E 1229, Standard Specification for Calcium Hypochlorite
- j. DOD 4145.19, Storage and Warehousing Facilities and Services
- k. DOD 4145.19-R-1, Storage and Materials Handling
- l. MIL-PRF-87930, Propellant, Hydrazine-Water (70% hydrazine – 30% water)
- m. MIL-T-8504, Tubing, Steel, Corrosion Resistant (304) Aerospace Vehicle Hydraulic Systems, Annealed, Seamless, and Welded
- n. SAE-AS33671, Strap, Tiedown, Electrical Components, Adjustable, Self-Clinching, Plastic, Type I, Class 1
- o. A-A-59282, Chemical, Analytical, General Specifications
- p. P-D-410, Dishwashing Compound, Hand (synthetic detergent, solid, and liquid form)
- q. T.O. 00-25-172, Ground Servicing of Aircraft and Static Grounding/Bonding
- r. T.O. 1F-16A-2-49-GS-00-1, Emergency Power System
- s. 49 CFR (Code of Federal Regulations) 100-185, Title 49 (Transportation)

Table 1-1. Physical Properties of H-70

Property	English Units	Metric Units
Boiling Point	243°F	117°C
Freezing Point	–56.6°F	–49.2°C
Liquid Density	8.587 lb/gal @70°F	1.029 g/ml @21°C
Hot Surface Ignition	523°F	273°C
Flash Point (open cup)	154°F	68°C

CHAPTER 2

HANDLING OF H-70 DRUMS

2.1 GENERAL.

This chapter provides requirements for receipt, storage, issue, and the return of drums used for H-70 servicing at Air Force bases. Included in this chapter are the requirements for serviceable filled H-70 drums, filled reclaim H-70 drums, and empty drums that have contained H-70. The procedures for containment and cleanup of H-70 spills are covered in [Chapter 3](#).

2.2 RESPONSIBILITIES.

The unity activity or section which has possession of the H-70 drum is responsible for performing the instructed procedures described in the following paragraphs. Deviations to any of the following described procedures are only permissible if specified by local Safety Office, Health Office, and Fire Prevention Office requirements.

2.3 CONTROLLED AREAS.

Controlled areas shall be established according to AFOSH STD 48-8, Attachment 8. The supervisor shall ensure caution signs are displayed at each entrance to controlled areas, properly illuminated, and free of obstructions. Each sign shall be a standard yellow caution sign sized between 7x10 and 20x28 inches. The word CAUTION shall be displayed in yellow letters on a black rectangular pattern at the top of the sign. The width of the rectangle shall be 5/8 inch less than the width of the sign. Beneath the caution label, the following words shall be displayed:

HYDRAZINE-WATER FUEL
COMBUSTIBLE CANCER SUSPECT AGENT
AVOID VAPORS AND SKIN CONTACT
WEAR PROTECTIVE EQUIPMENT
NO SMOKING, EATING OR DRINKING

2.4 USE OF PROTECTIVE CLOTHING.



The hydrazine component of H-70 is a suspect human carcinogen. Prolonged exposure to direct skin and/or inhalation of very low concentrations of H-70 is extremely hazardous to

your health. Personnel must wear proper protective equipment and respiratory protection when there is a possibility of coming into contact with any H-70 liquid and/or vapor fumes. Failure to comply may result in BODILY INJURY, EYE INJURY, and SEVERE BURNS.

The following paragraphs may require the use of proper protective equipment and respiratory protection. See [Table 2-2](#) for list of approved protective equipment. Although protective clothing has been tested against and approved for use with hydrazine, direct contact with H-70 should still be avoided. If the impervious clothing is splashed with H-70, it should be rinsed with water. At the end of the operation all contaminated protective clothing should be decontaminated with a neutralizing agent.

2.5 USE OF COLORIMETRIC TUBES.

Use MSA Universal Tester Model 1 Pump, P/N 83500, and MSA Universal Tube, P/N 460425, or equivalent.

- a. Colorimetric tubes shall not be used to determine health safe limits. They shall be used solely as hydrazine leak detection devices. The best detection limits of colorimetric tubes for hydrazine are near 1 ppm. Because of this limitation, colorimetric tubes are not suitable for accurately determining lower concentrations such as the 0.1 ppm level used in health exposure standards.
- b. The maximum number of pump strokes shall be used as recommended by the tube manufacturer. This will optimize the leak detection capability. Check the manufacturer's directions to determine the maximum pump strokes which may be used.
- c. A colorimetric tube may be used for checking more than one drum provided the color of the tube has not changed. Opened colorimetric tubes should be capped between uses to prevent chemical changes in sampling media.
- d. If a color change is not obtained on a drum which is suspected to be leaking, a new tube should be used to make sure the first tube worked properly.
- e. All opened (glass seal broken) tubes shall be discarded at the end of each shift.

- f. Colorimetric tubes from one manufacturer shall not be used with a pump from another manufacturer. Use of a pump from one manufacturer and a tube from another manufacturer will produce inaccurate results.

2.6 RECEIPT.

- a. Check drums for damage. Any area of damage not visibly leaking, but suggesting the possibility of a leak, shall be tested using a colorimetric indicator tube. (See Paragraph 2.5.) If leak monitoring assistance is required for damaged drums, contact the Base Bio-Environmental Engineer.
- b. Check bungs of drums for leaks using a colorimetric indicator tube.
- c. Check markings on drums to ensure that H-70 has been provided. The exact name identification on the outside of the drum must be HYDRA-ZINE-WATER, 70/30. If a drum has questionable markings, its serial number may be compared with the accompanying documentation to verify its contents.

2.7 CHECKING FOR H-70 LEAKS.

If a vapor leak is suspected at the bung or other area of the drum use colorimetric tubes discussed in Paragraph 2.5. If a liquid is suspected it should be tested using litmus paper (Vivid 9-13, Micro-Essential Laboratories Catalog Number 46). A strip of litmus paper several inches in length should be dipped into or wiped across the liquid. Either wear protective gloves or use long pieces of litmus paper to help avoid skin contact with liquids suspected of being hydrazine. If the litmus paper turns purple, assume the liquid is H-70, and proceed according to Chapter 3.

2.8 STORAGE OF DRUMS.

NOTE

The following paragraph applies to the storage of drums, except those drums stored within servicing facilities. Servicing facility documents contain local requirements for the storage of drums.

Requirements are provided in regulation DOD 4145.19-R-1 and this chapter. H-70 shall be stored as a special commodity because it is corrosive, toxic, and combustible. H-70 has a flash point between 67° and 69°C (153° and 156°F) and is therefore considered a Class IIIA combustible liquid in terms of regulation DOD 4145.19-R-1. H-70 does not meet the criteria for an explosive as defined by AFMAN 91-201; however, the separation distance between H-70 and explosives is provided therein. Minimum separation distance between H-70 storage and oxidizer (e.g. liquid, gaseous

oxygen) storage shall be in accordance with Table 2-1. The larger quantity of the two products to be separated shall be used to determine the separation distance. H-70 should not be stored within 100 feet of public traffic routes, inhabited buildings, civilian or government leasing areas, public facilities such as schools, churches, clubs, sewage treatment plants, rivers, lakes, or streams.

- a. Do not lift drums by placing fork lift tines under the rolling hoops.
- b. Store drums with bungs up.
- c. Store drums in such a manner that any drum can be inspected or removed without moving more than one other drum.
- d. Inspect drums for leakage at least once each week. See Paragraph 2.5 through Paragraph 2.7.
- e. Drums shall be separated by grouping them as follows:
 - Drums of Serviceable H-70
 - Filled Reclaim Drums
 - Empty Drums for Storage and Return
 - Empty Drums for Reclaim Use

Each group shall be separated from each other group by at least 2 feet.

- f. Drums other than those stored in the H-70 Servicing Facility shall be stored in an area which is dyked to contain 100 gallons or 25% of the total volume of H-70 stored within the dyked area, whichever is greater.
- g. Drums should be stored so that their temperature does not exceed 120°F (49°C).

2.9 FILLED RECLAIM DRUMS.

WARNING

Only demineralized water, distilled water, H-70, and nitrogen may be added to partially full or empty drums, except when treated in accordance with Paragraph 2.13. H-70 contains hydrazine, a reactive chemical. Addition of other solids, liquids, or gases may initiate a violent reaction.

A reclaim drum is connected to the servicing stand to collect H-70 removed from EPU fuel tanks and small amounts of H-70 used to purge the fuel lines of the servicing stand. Filled reclaim drums shall be clearly marked as containing unserviceable fuel. These drums shall be sampled and tested according to Chapter 4. Usability or disposition instructions will be provided with test results.

2.10 EMPTY DRUMS FOR STORAGE AND RETURN.

WARNING

Hazardous levels of hydrazine vapors may occur during performance of following procedures. Personal protective equipment shall be worn unless specified otherwise by the Local Bio-Environmental Engineer or the Base Safety Office.

- a. Put on gloves, coveralls, apron, boots, and a supplied air respirator. This equipment is identified in [Table 2-2](#) and [Table 2-3](#). Changes to this requirement for protective equipment may be made by the Bio-Environmental Engineer based on exposure levels and operation parameters. See Paragraph [2.4](#).
- b. Before removing an empty drum from the servicing stand, assure that all available H-70 has been removed. This shall be accomplished by tilting the drum while transferring fuel from the drum. The drum shall be tilted so that the H-70 is deepest near the eductor pipe.
- c. Remove the large bung and pour 1 gallon of demineralized or distilled water into the drum to reduce the fire hazard of the residual.
- d. Mark drum as containing unserviceable, diluted fuel.
- e. After replacing and tightening the bungs, clean surface of bungs with a damp, clean, cotton cloth, then test them for vapor leaks using a colorimetric indicator tube. See Paragraph [2.5](#).
- f. After verifying that the bungs are not leaking, bind them with safety wire using the holes provided for this purpose. Apply a lead seal to the safety wire ends.
- g. Place empty drum in storage for return to the supplier.

2.11 EMPTY DRUMS FOR RECLAIM USE.

One empty drum removed from the servicing stand shall be kept to replace a filled reclaim drum. This empty drum shall not have water added to it. Mark drum for reclaim use and place in storage.

2.12 LEAKING DRUMS.

WARNING

Hazardous levels of hydrazine vapors may occur when drums are leaking.

- a. Wear gloves, coveralls, apron, boots, and a supplied air respirator, described in [Table 2-2](#) and [Table 2-3](#). See Paragraph [2.4](#).
- b. If a drum is leaking at a bung, try to stop it by tightening the bung. If this fails, replace the polytetrafluoroethylene gasket and tighten the bung again.

WARNING

Do not transfer contents of a leaking drum by pressurizing the drum.

- c. If the leak cannot be stopped, transfer contents to a drum marked for reclaim use. Ground and bond drums prior to transfer. (See T.O. 00-25-172 for general guidance on grounding/bonding.) A pump may be used ([Table 2-4](#)) according to the manufacturer's directions. Decontaminate the defective drum in accordance with Paragraph [2.13](#). Identify the defective drum as unserviceable and report the drum, by serial number, to Wright-Patterson ALC/AFTT.
- d. All drums which were leaking, and drums into which H-70 has been transferred, shall be clearly marked as containing unserviceable fuel and shall be treated in the same way as reclaim drums. These drums shall be placed in storage until they can be sampled and tested according to [Chapter 4](#). Usability or disposition instructions will be provided with test results.
- e. Clean up drips and spills using procedures described in [Chapter 3](#). Decontaminate the pump by placing it in a polyethylene tank, (Cole-Parmer Instrument Co., P/N E-06317-75 or equivalent), approximately $\frac{3}{4}$ full of water. Pump the water through the pump. Then treat the water as described in [Chapter 3](#). Pump bleach solution through pump to decontaminate inner parts. Test bleach solution to ensure that all hydrazine has been destroyed. Excess chlorine (see Paragraph [2.13](#)) indicates that the hydrazine has been destroyed. After treating equipment to destroy hydrazine clean it according to Paragraph [2.15](#).

NOTE

Decontamination actions must be coordinated with the Bio-Environmental Engineer.

2.13 DECONTAMINATION OF DEFECTIVE DRUMS.

WARNING

The DPD method for chlorine will not work in this application.

- a. Test for Chlorine – this test will be used during the decontamination procedure to find out if enough calcium hypochlorite has been added to destroy all hydrazine present. Personal protective equipment shall be worn during the test. Collect 20 mL of the solution to be tested in a clean, small, glass container. Add ½ teaspoon of potassium iodide. A bright reddish orange solution indicates excess chlorine and that all hydrazine has been destroyed. A colorless or pale yellow solution indicates that hydrazine may be present. After testing, pour the tested solution into the polyethylene tank. Rinse the glass container with demineralized or distilled water using the wash bottle, and collect rinsings in the tank.
- b. Drum Decontamination Procedure.
 - (1) Coordinate action with the Base Environmental Coordinator and the Base Bio-Environmental Engineer.
 - (2) Establish a regulated area for performance of this procedure. Outdoor areas should be downwind (prevailing winds) from inhabited areas. Indoor areas with adequate ventilation may be utilized if approved by the Bio-Environmental Engineer; however, it must be assured that room exhaust is not picked up by building fresh air intakes.

WARNING

The hydrazine component of H-70 is a suspect human carcinogen. Prolonged exposure to direct skin and/or inhalation of very low concentrations of H-70 is extremely hazardous to your health. Personnel must wear proper protective equipment and respiratory protection when there is a possibility of coming into contact with any H-70 liquid and/or vapor fumes. Failure to comply may result in BODILY INJURY, EYE INJURY, and SEVERE BURNS.

- (3) Allow entrance to only those personnel needed.
- (4) Put on gloves, coveralls, apron, boots, and a supplied air respirator identified in [Table 2-2](#) and [Table 2-3](#).
- (5) Tilt the drum so that the H-70 will pool underneath the large bung.

WARNING

Hazardous levels of hydrazine vapors may occur when the bung is removed from the drum.

- (6) Remove the large bung from the drum.
- (7) At this point the drum should contain only residual H-70 (1 gallon or less). If more than this residual is present, transfer as much as possible to a drum marked for reclaim use. Use the polyethylene hand pump. Ground and bond drums prior to transfer. See T.O. 00-25-172 for general guidance on grounding/bonding.

WARNING

The following dilution steps are necessary to eliminate the possibility of a fire when the oxidizing agent is added, to reduce chemical fuming, and to lower airborne hydrazine levels.

- (8) Add 20 gallons of tap water to the drum.

NOTE

Before final disposal of treated solutions, consult the Bio-Environmental Engineer and Base Environmental Coordinator to ensure that applicable pollution laws are followed. Treated solutions may usually be released to the sanitary or industrial waste sewer system. Before disposing of solutions in a sewer it may be necessary to treat excess chlorine with sodium thiosulfate until a negative test for chlorine is obtained.

- (9) Transfer portions of the diluted H-70 to the polyethylene tank using the hand pump. While stirring each portion with the paddle, cautiously and slowly add calcium hypochlorite. Forty-two pounds of calcium hypochlorite will destroy the hydrazine in 1 gallon of H-70. A vigorous bubbling action will be observed as the hydrazine is oxidized to nitrogen gas, and the solution will become warm. Continue to add calcium hypochlorite at a rate to maintain a vigorous, but not violent reaction, until the bubbling ceases. Test treated portions according to Step a. If test is positive (chlorine present), treated portions may be released according to above note. If not, add ¼ pound of calcium hypochlorite, mix, and retest. Repeat as required until a positive test is obtained.
- (10) Add approximately 2 gallons of tap water to the drum.
- (11) Replace and tighten the large bung.
- (12) Roll and invert drum to ensure that all inside surfaces are rinsed with water.
- (13) Remove large bung.
- (14) While agitating the liquid by gently rocking the drum from side to side, cautiously and slowly

add approximately 2 pounds of calcium hypochlorite.

- (15) Test the liquid for excess chlorine. The hand pump may be used to draw samples. If the test is positive (chlorine present), continue to Step (16). If not, add another ¼ pound of calcium hypochlorite and retest. Repeat as required until a positive test is obtained and then continue to Step (16).
- (16) Replace and tighten the large bung.
- (17) Roll and invert drum to ensure that all inside surfaces are wetted with the calcium hypochlorite solution.
- (18) Remove large bung and test for excess chlorine. If test is positive, the contents of the drum may be released according to the note above Step (9); continue to Step (19). If not, add another ¼ pound of calcium hypochlorite and return to Step (16).
- (19) Clean up drips and spills using procedures described in Chapter 3. Decontaminate the hand pump according to Paragraph 2.12, Step e.

2.14 DRUMS OF CONTAMINATED H-70.

Disposition instructions for drums of contaminated H-70 will be provided by Det 3, WR-ALC/AFTT, DSN: 785-5080 upon request.

2.15 CLEANING AND STORAGE OF EQUIPMENT.

Clean equipment using a hot detergent solution. Inner parts of the pump may be cleaned by pumping the detergent solution through it. Rinse equipment with 3 portions of tap water followed by 3 portions of demineralized water. Allow equipment to air dry. Store equipment in a clean, dry cabinet.

Table 2-1. Distance between Oxidizers and H-70 Storage

Pounds of Product		Separation Distance in Feet	Pounds of Product		Separation Distance in Feet
Over	Not Over		Over	Not Over	
	100	60	60,000	70,000	255
100	200	75	70,000	80,000	260
200	300	85	80,000	90,000	265
300	400	90	90,000	100,000	270
400	500	100	100,000	125,000	285
500	600	100	125,000	150,000	295
600	700	105	150,000	175,000	305
700	800	110	175,000	200,000	310
800	900	115	200,000	250,000	320
900	1,000	120	250,000	300,000	330
1,000	2,000	130	300,000	350,000	340
2,000	3,000	145	350,000	400,000	350
3,000	4,000	150	400,000	450,000	355
4,000	5,000	160	450,000	500,000	360
5,000	6,000	165	500,000	600,000	375
6,000	7,000	170	600,000	700,000	385
7,000	8,000	175	700,000	800,000	395
8,000	9,000	175	800,000	900,000	405
9,000	10,000	180	900,000	1,000,000	410
10,000	15,000	195	1,000,000	2,000,000	470
15,000	20,000	205	2,000,000	3,000,000	505
20,000	25,000	215	3,000,000	4,000,000	535
25,000	30,000	220	4,000,000	5,000,000	555
30,000	35,000	225	5,000,000	6,000,000	570
35,000	40,000	230	6,000,000	7,000,000	585
40,000	45,000	235	7,000,000	8,000,000	600
45,000	50,000	240	8,000,000	9,000,000	610
50,000	60,000	250	9,000,000	10,000,000	620
<div style="border: 1px solid black; padding: 10px; text-align: center;"> CAUTION </div> <p>Extrapolations above 1,000,000 pounds extend well outside data included in the BuMines report forming the original basic criteria. However, they are supported by independent calculations and knowledge of like phenomena.</p>					

Table 2-2. Protective Equipment

Nomenclature	NSN	Size
SKIN PROTECTION		
Faceshield	4240-00-542-2048	
Lint-free Tan Safety Industrial Coveralls	8415-00-939-7879	X-Small
	8415-00-939-7880	Small
	8415-00-939-7881	Medium
	8415-00-926-5113	Large
	8415-00-939-7882	X-Large
Rocket Fuel Handler's Coveralls	8415-00-725-3627	Small
	8415-00-725-3628	Medium
	8415-00-725-3629	Large
	8415-00-725-3630	X-Large
	8415-00-725-3631	XX-Large
Rocket Fuel Handler's Vinyl Coated Gloves (without ring)	8415-00-916-2817	Medium
	8415-00-916-2818	Large
Rocket Fuel Handler's Gloves (with ring to mate to sleeve of rocket fuel handler's coveralls)	8415-00-753-6212	Small
	8415-00-753-6213	Medium
	8415-00-753-6214	Large
	8451-00-753-6215	X-Large
<p style="text-align: center;">NOTE</p> <ul style="list-style-type: none"> Gloves listed below are suitable for one time use during spill cleanup operations if RFH gloves are unavailable or if RFH gloves are unsuitable because of task dexterity requirements. Prior to use, gloves shall be inspected for holes, tears, and cracks. Following any H-70 spill cleanup, the gloves shall be decontaminated by inserting the gloved hand into a container of household bleach (approximately 5% available chlorine) followed by a water rinse. Decontamination of gloves prior to removal significantly reduces the probability of skin contact with unreacted hydrazine during glove removal. Discard gloves after decontamination. Gloves listed below may be used during routine maintenance tasks. Prior to use, they shall be inspected for holes, tears, and cracks. Following routine maintenance during which no H-70 contact has been observed, the glove may be reused following decontamination as described in the above paragraph. If liquid contact has occurred, the glove shall be disposed of following decontamination. 		
Toxicological Agent Protective Gloves (Butyl Rubber)	8415-00-753-6550	X-Small
	8415-00-753-6551	Small
	8415-00-753-6552	Medium
	8415-00-753-6553	Large
	8415-00-753-6554	X-Large
Toxicological Agent Protective Apron	8415-00-281-7812	X-Small
	8415-00-281-7813	Small
	8415-00-281-7814	Medium

Table 2-2. Protective Equipment - Continued

Nomenclature	NSN	Size
	8415-00-281-7815	Long
	8415-00-281-7816	X-Long
Type II, Class I Fireman's Boots	8430-00-753-5935	5
	8430-00-753-5936	6
	8430-00-753-5937	7
	8430-00-753-5938	8
	8430-00-753-5939	9
	8430-00-753-5940	10
	8430-00-753-5941	11
	8430-00-753-5942	12
	8430-00-753-5943	13
	8430-00-753-5944	14
	8430-00-753-5945	15
Rocket Fuel Handler's Hood	8415-00-753-6210	
<p style="text-align: center;">NOTE</p> <p>Respiratory protection may be provided by any Type C supplied respirator as listed in AFOSH STD 48-1. Additionally, current technology has yielded approval of other self contained breathing units not listed in this table. Contact your Bio-Environmental Engineering Flight for endorsement of other respiratory protective devices available for hydrazine servicing. Personnel must be medically qualified by a physician, fit tested, and trained by Bio-Environmental Engineering prior to wearing any respiratory protective devices available for hydrazine servicing.</p>		
RESPIRATORY EQUIPMENT		
Air Compressor (for inline respirators)	4310-00-289-8249	
Air Purifier Assembly	4310-00-173-0995	
<p style="text-align: center;">NOTE</p> <p>Three different, qualified respirators may be received when requisitioning this item: U.S. Divers (T.O. 14S5-18-1), MSA (T.O. 14S5-16-1), and the Scott, 30-minute Air-Pack II, a pressure demand, back-pack style, 900014 series (T.O. 14S5-11-11). The Scott respirator is the preferred item because of the availability of the Scott Speak-Ezee II, a self-contained voice amplification device which fits the Scott mask. This device allows personnel wearing faceplate respirators to satisfactorily communicate with others. This device is approved by National Institute of Occupational Safety and Health (NIOSH) for use with the Scott Air-Pak and Scott Air Supplied Respirators, but is not qualified for use when used with other masks. The voice amplification device (NSN 4240-00-062-0694) includes the Speak-Ezee II with battery, bracket, feed-through microphone, and nose cup. The nose cup diminishes mask fogging and icing during cold weather.</p>		
Respirator, Pressure Demand, Back-Pack	4240-00-919-2864	

Table 2-3. Protective Equipment – Task Matrix

	Addition of Water to H-70 Drum	Correcting Drum Leaks	Fuel Transfer Using Pump	Decontamination of Drums	Cleanup of H-70 Spills	Venting of Drums
Industrial Coveralls	X	X	X	X		
Protective Apron	X	X	X	X		
Rocket Fuel Handler's Gloves	X	X	X	X	X	X
Boots	X	X	X	X	X	X
Rocket Fuel Handler's Coveralls					X	X
Respiratory Protection	X	X	X	X	X	X
Rocket Fuel Handler's Hood					X*	X
* The hood shall be used when drainage may contact the skin, when windy condition may blow liquid, or when a hydrazine spray such as from a pressure leak may be encountered.						

Table 2-4. Equipment and Reagents for Transfer of H-70 and Neutralization of Hydrazine

Nomenclature	P/N or NSN	Use and Application
Polyethylene Hand Pump	Cole-Parmer Instrument Co. ¹ P/N E-06425-00 or equal	Transfer of H-70 and other solutions
Air Driven Pump Stainless Steel Air Motor Grounding Wire Air Filter/Regulator Air Lubricator Tube	Cole-Parmer Instrument Co. ¹ P/Ns or equal E-07075-34 E-07075-56 E-98252-00 E-07042-70 E-07075-79	Transfer of H-70 and other solutions
Polyethylene Tank, 55-gallon	Cole-Parmer Instrument Co. ¹ P/N E-06317-75 or equal	Neutralization of hydrazine
Plastic Paddle	NSN 7330-00-782-3247	Mixing during neutralization
Laboratory Wash Bottle, 500 mL	NSN 6640-00-069-2747	Rinsing of chlorine test container
Calcium Hypochlorite, 65%, Granular	ASTM E 1229 ²	Neutralization of hydrazine
Potassium Iodide	A-A-59282	Used to detect excess chlorine
Sodium Thiosulfate (optional)	NSN 6810-00-234-8380	Treatment of excess chlorine
¹ Equipment items only available under manufacture part number has no National Stock Number (NSN) assigned. Contact Cole-Parmer Instrument Co. directly to order items. Phone: 1-800-323-4340 or write to 625 E. Bunker CT, Vernon Hills, IL 60061.		
² Local pollution regulations may forbid the transfer of waste water containing chlorine to the storm drain or sanitary sewer. Sodium thiosulfate reagent may be needed for treatment of the waste solution to destroy excess chlorine.		

CHAPTER 3

SPILL CONTROL AND CLEANUP

3.1 PURPOSE.

This chapter provides procedures for response, control, and cleanup of H-70 spills.

3.2 APPLICATION.

This chapter applies to any Air Force activity which must respond to an H-70 spill except a spill in or around F-16 aircraft. The latter is managed according to T.O. 1F-16A-2-49-GS-00-1. Procedures in this chapter may be provided to commercial carriers for informational purposes only.

3.3 RESPONSIBILITIES.

- a. The agency, DOD or commercial, which is transporting, storing, or otherwise handling chemical materials at the time of a spill of such materials is responsible for spill management, control, and cleanup which includes reporting the spill to appropriate activities.
- b. Requests for assistance from commercial carriers of Air Force corrosive materials shall be managed as deemed appropriate by the Base Commander in accordance with Paragraph 216011, AFM 75-2. It is the carrier's responsibility to notify appropriate local authorities so that immediate action may be taken to protect people and the environment and to minimize adverse effects of the spill. Within CONUS it is also the responsibility of the carrier to report the spill as soon as practicable (day or night) to the U.S. Coast Guard National Response Center at (800) 424-8802. Reference: 49CFR171.15. In addition, commercial carriers may also call CHEMTREC (Chemical Transportation Emergency Center) which is operated by the Chemical Manufacturers Association. The toll free number is (800) 424-9300. In Washington DC, Alaska, or Hawaii call (202) 483-7616. CHEMTREC will supply information for safely managing a spill.
- c. When spills are to be cleaned up by the Air Force personnel, locally developed spill plans should be utilized. If there is no plan, the Commander of the installation responsible for cleanup shall assign one person with supervisory responsibility. The assigned person shall coordinate with Ground Safety, the Base Fire Marshall, Bio-Environmental Engineer, and Base Environmental Coordinator to ensure safe practices are followed and to ensure that practices are in compliance with pollution laws. If the spill is of such magnitude or unusual

circumstances as to reflect adversely on the USAF it may be considered a major accident requiring deployment of the disaster response force in accordance with AFI32-4004.

- d. Treated solutions shall be disposed of under supervision of the Base Bio-Environmental Engineer and coordinated with the Base Environmental Coordinator.
- e. The Base Bio-Environmental Engineer and Safety Office shall be consulted on the adequacy of protective equipment supplied by or to Air Force personnel (reference AFOSH Standards 91-31, 48-1, and 48-8). Commercial carriers requesting assistance should be advised to consult similar civilian health and safety experts on the adequacy of their equipment for the intended operations.
- f. See AFOSH STD 48-8 for health and safety guidance and special training requirements for workers.

3.4 AIRCRAFT.

Shipment of H-70 by air is authorized by AFJMAN24-204. In the event H-70 comes in contact with an aircraft in any way or degree, the responsible base maintenance activity should be notified immediately and the Aircraft Commander briefed on the occurrence. An appropriate entry shall be made on AFTO Form 781A, Maintenance Discrepancy/Work Document, which is aboard chartered LOGAIR aircraft, as the case may be.

- a. Spills aboard aircraft while aircraft is on the ground shall be cleaned up before take off. See Paragraph 3.5 through Paragraph 3.11.

WARNING

High concentrations of hydrazine vapors from H-70 can ignite or explode in the presence of oxygen. Maximum in-flight ventilation should be established before use of walk-around bottles (oxygen in pressure mode) during inspection for H-70 leaks.

- b. The Aircraft Commander shall appraise spills occurring in-flight and determine action to be taken. Once the aircraft is on the ground, complete cleanup of the spill shall be accomplished. Maximum in-flight ventilation shall be maintained to disperse or remove toxic vapors. Drums of H-70

shall be positioned in aircraft in such a location that spills, leakage, etc., can be readily detected. Such spills which may occur shall be evaluated by the Aircraft Commander in order to determine whether cleanup can be conducted at the next landing point or at the nearest emergency landing field.

3.5 ALTERNATE EQUIPMENT AND PROCEDURES.

Some of the following items may not be required due to the circumstances of the spill. Others may not be available and thus alternate equipment or procedures may be required. Approval of equipment and procedures shall be obtained from the Bio-Environmental Engineer.

3.6 EQUIPMENT AND REAGENTS.

- a. Protective Equipment – see [Table 2-2](#) and [Table 2-3](#).
- b. Polypropylene Felt Such as That Manufactured by the GAF Corporation – if felt is not available, clean, white, cotton cloth may be used. A clean, white, cotton mop with wooden handle may also be useful.

NOTE

For purposes of this procedure only stainless steel, galvanized steel, polypropylene, graphite, polytetrafluoroethylene, polyethylene, and glass are considered compatible with H-70.

- c. Drum Pump Constructed of Materials Compatible with H-70 – electrically powered pumps shall not be used. Air powered pumps are available. See [Table 2-4](#).
- d. Methanol – when temperature is below 0°C (32°F) prepare a 50% (V/V) methanol-water solution to be used in place of water during spill cleanup. Methanol conforming to Specification O-M-232 may be used in this mixture.
- e. Containers – empty stainless steel drums will be needed for large spills of H-70 or H-70 transferred from leaking drums. Open containers with lids (clean, galvanized trash cans may be used) are needed for collection of hydrazine contaminated water from the spill area. Another container will be needed for the chlorine test. These containers shall be clean and constructed of materials compatible with H-70.
- f. Equipment required to ground and bond drums during transfer.

- g. Oxidizing Reagent – household bleach (5% sodium hypochlorite). Approximately 100 volumes are required to treat 1 volume of H-70.
- h. Oxidizing Reagent – commercial HTH (65% calcium hypochlorite). Approximately 42 pounds are required to decompose 1 gallon of H-70. See [Table 2-4](#).

NOTE

Local regulations may forbid the transfer of waste water containing chlorine to the storm drain or sanitary sewer. Sodium thiosulfate reagent may be needed for treatment of the waste solution to destroy excess chlorine.

- i. Sodium Thiosulfate – (NSN 6810-00-234-8380 may be used.) This reagent is optional.

3.7 TEST FOR CHLORINE.



The DPD method for chlorine will not work for this application.

Collect 20 mL of the solution to be tested in a clean, small, glass container. Add ½ teaspoon of potassium iodide. A bright reddish orange solution indicates excess chlorine and that all hydrazine has been destroyed. A colorless or pale yellow solution indicates that hydrazine may be present.

3.8 PROCEDURE FOR CLEANUP.

The cleanup of an H-70 spill will entail 6 steps.

- Preparation (a, b, and c)
- Leak Stoppage (d)
- Containment (e)
- Dilution (f)
- Recovery (g)
- Decontamination (h)

These are presented in more detail below.

- a. Summon cleanup team and Bio-Environmental Engineer.
- b. Clear area of personnel not essential to the cleanup operation.
- c. Put on protective equipment.
- d. Stop liquid leaks from H-70 drums. This may be accomplished by positioning the drum so that the leaking area is uppermost. Vapor leaks may be allowed while cleanup of spilled H-70 is being performed.

e. Contain spill.

- (1) For Ground Spills – use earthworks.
- (2) For Concrete or Aircraft Spills – place polypropylene felt or clean, white cotton cloths around leading edge of spill.

f. Dilute spill – add a quantity of water approximately equal to the amount spilled if practical. This will reduce fuming and fire hazard.

g. Transfer spill to containers.

WARNING

- Pressure may develop within filled drums due to the presence of contaminants.
- Personal protective equipment shall be worn when venting drums. See [Table 2-2](#) and [Table 2-3](#).

- (1) For All Spills – if the spill is greater than three inches deep at any point, a drum pump may be used. A screened basin may be used under the inlet of the pump to prevent excessive trash and dirt from entering the pump. Transfer as much of the liquid as possible into a drum using the pump.

Vent drums into which H-70 has been transferred after one hour; repeat if significant pressure is observed. Vent after 24 hours; repeat daily if significant pressure release is observed. Vent by loosening bung and retightening. Contact Det 3, WR-ALC/AFTT at DSN: 785-8050 for disposition instructions.

- (2) For Ground Spills – transfer soil or other material wetted with H-70 into open containers filled halfway with water. A shovel may be used for this.
- (3) For Concrete or Aircraft Spills – mop up as much of the liquid as possible using polypropylene felt or clean, white, cotton cloths. Felt or cloth may be squeezed out over an open container filled halfway with water. Cover the spill area with water and mop up as before. Place felt or cloths in open containers with transferred spill.

h. Decontaminate surfaces – the Bio-Environmental Engineer should be involved in the final stages of cleanup to ensure that hydrazine is removed or destroyed.

- (1) For Concrete Surfaces – treat the spill area with small amounts of bleach. Test liquid from area

in accordance with Paragraph [3.7](#). The Bio-Environmental Engineer can assist in this chemical test. When excess chlorine can be detected in this liquid the surface is free of hydrazine.

CAUTION

Due to a potential for chemical reaction with aircraft components, bleach shall not be used for decontaminating aircraft surfaces.

- (2) For Aircraft Surfaces and Other Surfaces Not Compatible with Bleach – the spill area should be rinsed with large amounts of water while collecting the rinsings in an open container. Wash the spill area with mild detergent, Federal Specification P-D-410, and water solution (prepare solution by mixing $\frac{1}{2}$ ounce of detergent in 1 gallon of warm water). Rinse and collect the rinsings as before. Irregular surfaces and other hard to clean surfaces may be checked with litmus paper and/or colorimetric tubes (see Paragraph [2.5](#)) to search for areas not effectively cleaned. Tube inlets should be held close to the suspect area when sampling air for hydrazine.

3.9 HANDLING OF LEAKING DRUMS.

See Paragraph [2.12](#).

3.10 PROCEDURE FOR DECOMPOSITION OF HYDRAZINE IN WASTE H-70.

WARNING

The following dilution step is necessary to eliminate the possibility of a fire when the oxidizing reagent is added, to reduce chemical fuming, and to lower airborne hydrazine levels.

- a. Transfer a quantity of waste hydrazine solution from the open containers to another open container and dilute it with water until the concentration is about 1 part hydrazine to 20 parts water.
- b. Add oxidizing reagent cautiously in small amounts while stirring the waste solution. A vigorous bubbling action will be observed as hydrazine is oxidized to nitrogen gas, and the solution will become warm. Continue to add bleach at a rate to maintain a vigorous, but not violent reaction, until the bubbling ceases.

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- c. Check the treated waste solution for chlorine (Paragraph 3.7). If test is negative, continue adding small amounts of oxidizing reagent and testing until a positive test for chlorine is obtained.
- d. Repeat the above steps until all the waste solution has been treated.
- e. Cover pieces of felt or cloth used during cleanup with water and treat with oxidizing agent until a positive test for chlorine is obtained.

The treated waste solution may usually be released to the sanitary or industrial waste sewer system. Before disposing of the solution in a storm sewer it may be necessary to treat the excess chlorine with sodium thiosulfate until a negative test for chlorine is obtained with potassium iodide in accordance with Paragraph 3.7.

3.11 FINAL DISPOSAL.

Before final disposal of the treated waste solution, consult the Bio-Environmental Engineer and Base Environmental Coordinator to ensure that proper procedures are followed.

CHAPTER 4

REQUALIFICATION

4.1 PURPOSE.

This chapter provides guidance, standards, and procedures for requalification of defueled or otherwise suspect H-70.

4.2 SCOPE.

This chapter applies to drums of H-70 at facilities where the F-16 aircraft is serviced.

4.3 RESPONSIBILITIES.

- a. The organization servicing the Emergency Power Unit (EPU) fuel tank shall prepare sampling equipment, sample H-70, and coordinate with base supply and Traffic Management Office to accomplish actions necessary to ship samples to an Aerospace Fuels Laboratory (Paragraph 4.11). This organization will be referred to as the servicing organization in the remainder of this chapter.
- b. The Aerospace Fuels Laboratories shall analyze samples for components and contaminants identified in Paragraph 4.12.
- c. Contact Det 3, WR-ALC/AFTT, DSN: 785-8050 for assistance with H-70 quality problems.

4.4 SAMPLE IDENTIFICATION.

The servicing organization shall prepare a tag (AFTO Form 475) at each sampling time. The tag shall contain the following information:

- a. Name, Location, and Telephone Number of Organization Submitting the Sample
- b. Sample Number (The sample number is the submitting activity identifier. Samples should be numbered consecutively during a calendar year. For example, in 1998 the first sample number is 98-1, the second is 98-2, etc.)
- c. Name of Product: H-70
- d. Specification Number: MIL-PRF-87930
- e. Drum Serial Number
- f. Date Sampled

4.5 SAMPLING KIT, HYDRAZINE — REPLACEMENT PARTS.

This kit includes a metal box which serves as a container and bottle holder. If this box, which will be called the sampling kit box in the remainder of this chapter needs replacement, then the complete kit should be ordered.

- a. Stopper, Rubber, Two-Hole. Fisher Scientific, P/N 14-140D or equal (a, [Figure 4-1](#)).

NOTE

Tubing lengths do not need to be exact and should be cut to the approximate size of the part to be replaced.

- b. Tubing, Steel, Corrosion Resistant (304), Aerospace Vehicle Hydraulic Systems, Annealed, Seamless, and Welded, ¼ inch OD MIL-T-8504 (b, [Figure 4-1](#)).
- c. Tubing, Nonmetallic (Rubber and Plastic), Polyvinyl Chloride, Clear, ¼ inch ID, ½ inch OD A-A-52047, Type 6, Class 6 (c, [Figure 4-1](#)).
- d. Strap, Tiedown, Plastic, MS3367-4-9 (d, [Figure 4-1](#)).
- e. Connector, Y-Shaped, Polypropylene, for ¼ inch ID Tubing. Fisher Scientific, P/N 15-320-10C or equal (e, [Figure 4-1](#)).
- f. Stopcock, Polypropylene, Teflon Plug, for 1/4 inch to 3/8 inch ID Tubing. Nalge Company, P/N 6460-0002 or equal (f, [Figure 4-1](#)).
- g. Bulb, Pressure and Circulating, Laboratory Rubber, MS36074-1 (g, [Figure 4-1](#)).
- h. Bottle, Narrow Mouth, 16 oz, Cap Size 28-400 with Poly-Seal-Lined Closure. Fisher Scientific, P/N 03-326-5E or equal (h, [Figure 4-1](#)).

4.6 CLEANING SAMPLING EQUIPMENT.

WARNING

The following procedure is not to be used to remove traces of H-70 from equipment. This must be accomplished according to Paragraph 4.10, Steps s through y.

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Bottles, caps, tubing, stoppers, and stopcock shall be cleaned to keep from contaminating the sample. The bulb does not require cleaning.

- a. Wash in hot water with detergent.
- b. Rinse in warm tap water.
- c. Rinse 3 times with distilled or demineralized water.
- d. Place in oven at 150° to 170°F for 6 hours.
- e. Place in plastic and tie bags.

4.7 ASSEMBLY OF SAMPLING APPARATUS.

Assemble apparatus as shown in [Figure 4-1](#). Place the assembled apparatus in the sampling kit box.

- a. Slip flexible tubing over steel tubing or rigid plastic parts. It will grip firmly and will not need any clamps.
- b. Fill bottle connected directly to the rubber bulb approximately 60% full of demineralized water.
- c. The sample bottle may be calibrated by adding 350 milliliters of demineralized water to it using the graduated cylinder. A mark should be made at the water line on the bottle using the felt tip pen. The sample bottle must be dried ([Paragraph 4.6](#)) before connecting it to the sampling apparatus.

4.8 DRUM PREPARATION.

CAUTION

Drum rolling hoops must not be used for lifting drums.

A fork lift may be used to position drum.

- a. Invert the drum for 20 minutes.
- b. Place drum on its side and roll slowly five turns.
- c. Roll in the opposite direction five turns.
- d. Return to an upright position.
- e. Rinse top of drum with tap water.
- f. Dry top with damp gauze pads.
- g. Sample drum within 10 minutes following agitation.

4.9 PERSONAL PROTECTIVE EQUIPMENT.

Refer to [Table 2-2](#) and [Table 2-3](#) (fuel transfer using pump).

4.10 SAMPLING PROCEDURE.

WARNING

Personal exposure to H-70 should be anticipated when conducting following procedure. Personnel protective equipment consisting of self-contained breathing apparatus with a full face piece operated in pressure demand or other positive pressure mode, coveralls, impermeable apron, rocket fuel handler's gloves, and rubber boots shall be worn while the drum of H-70 is open. Failure to do so could result in serious injury to personnel performing these duties.

- a. Fill a suitable container (made of stainless steel, polypropylene or polyethylene) half full of water.
- b. Place box with sampling apparatus on top of drum.
- c. Close stopcock. The stopcock may be turned in either direction. When the handle is parallel to the tubing the line is open. When the handle is at a right angle to the tubing, the line is closed.
- d. Remove bung slowly to relieve any pressure which may have built up during storage. Remove bung by turning it counterclockwise.
- e. Place bung on a gauze pad and rinse with demineralized water over a suitable container. Keep bung on a clean surface until it is replaced ([Step 1](#)).
- f. Insert the tubing connected to the sampling bottle into the H-70 in the drum.

NOTE

The bulb should be pumped vigorously, with force, at the start. If this is not done, the valve in the bulb may not seat properly. This may cause a reverse flow and water from the scrubber bottle may contaminate the sample bottle.

- g. Pump rubber bulb to obtain the sample. If a reverse flow is observed, stop sampling by opening the stopcock, remove the stopper from the sample bottle, and cap the bottle. Set this contaminated bottle aside for later treatment ([Paragraph 3.10](#) and [Paragraph 3.11](#)). Connect a clean sample bottle, close the stopcock, and begin this step over again.

WARNING

The sample bottle must not be over 90% full (430 milliliters). Room must be left for the H-70 to expand. An overfilled bottle may leak or burst.

- h. When the sample bottle is about 3/5 to 3/4 full, stop flow by opening the stopcock. This quantity, about 300 to 375 milliliters, is all that is needed for testing. See Paragraph 4.7, Step c for calibrating the sample bottle.
- i. Remove the rubber stopper from the sample bottle. The stopper with tubing should remain in the sampling kit box.
- j. Screw the cap on the bottle until it is finger tight.
- k. Remove the tubing from the drum and place it in the sampling kit box.
- l. Install bung in the drum and tighten it as required.
- m. Clean top of drum thoroughly with damp gauze pads. Discard gauze pads in a suitable container for later treatment.
- n. Using a colorimetric indicator tube, check drum top for H-70 vapors. Tighten bungs or reclean top until no vapors are detected.

NOTE

During the remainder of the procedures, respiratory protection requirements shall be based on recommendations made by the Bio-Environmental Engineering Flight.

WARNING

A faceshield shall be worn anytime a full face piece respirator is not worn.

- o. Clean any H-70 drips on the sample bottle with a damp gauze pad. Discard gauze pad in a suitable container for later treatment.
- p. Place the sample bottle in a polyethylene bag and tie the bag.
- q. Lay filled sample bottle on its side and visually check for leaks at this time and after 10 minutes have passed. If a leak is observed, tighten or replace the cap. Repeat the check for leaks. If the leak cannot be stopped, destroy the sample and

decontaminate the sample container using procedures in Paragraph 3.10 and Paragraph 3.11.

- r. If no leakage is observed, attach a sample identification tag (see Paragraph 4.4 above), and arrange for transportation of the sample to the Traffic Management Office (TMO). The sample may be placed in a paint can with vermiculite (Table 4-1) before taking it to the TMO.

NOTE

The purpose of the remaining steps of the sampling procedure is to decontaminate or remove any remaining H-70 from the sampling equipment.

- s. Disassemble the sampling apparatus and place each component in the container.
- t. Submerge each component in the water and rinse thoroughly. Remove each component from the container and rinse with demineralized water. Catch rinse water in the container.
- u. Place components in a polyethylene bag and tie bag. After 10 minutes or more, open bag, place colorimetric tube in bag opening and check for H-70 vapors. If vapors are detected, rinse each component with demineralized water again. Catch rinse water in the container as before. Place components in a new polyethylene bag. Wait at least 10 minutes before checking for H-70 vapors. Continue in this manner until no H-70 vapors are detected.
- v. Set components aside for cleaning according to Paragraph 4.6.
- w. Rinse sampling kit box with water. Pour water from box into the container.
- x. Check box for H-70 vapors using colorimetric tube. Repeat Step w if necessary.
- y. Cover contaminated gauze pads with water. Treat this and the container with contaminated rinse water according to procedures in Paragraph 3.10 and Paragraph 3.11.

4.11 SHIPMENT OF SAMPLES.

Shipment of sample shall be coordinated with the Traffic Management Office.

- a. Samples shall be packaged, marked, labeled, and shipped according to the following:
 - (1) Title 49, Code of Federal Regulations (49 CFR).
 - (2) United Nations (UN)/International requirements as stipulated in the International Civil Aviation

Organization's (ICAO), TECHNICAL INSTRUCTIONS FOR THE SAFE TRANSPORTATION OF DANGEROUS GOODS BY AIR.

- (3) International Air Transport Association's (IATA), DANGEROUS GOODS REGULATIONS.
- (4) International Maritime Organization's (IMO), INTERNATIONAL MARITIME DANGEROUS GOODS CODE (IMDGC).
- (5) AFJMAN24-204, PREPARING HAZARDOUS MATERIALS FOR MILITARY AIR SHIPMENTS.

Applicable documents are dependent on mode of transportation and destination. The package described in Table 4-1 meets these requirements and is complete as supplied. Any addition, removal, or substitution of parts may make it unsuitable for shipping.

- b. No more than one sample bottle will be shipped in one package.
- c. Laboratory Addresses. Other laboratories may be authorized by Det 3, WR-ALC/AFTT, DSN: 785-8050.
 - (1) Aerospace Fuels Laboratory (FP2078)
OL Det 3, WR-ALC/AFTLH
15251 Scrub Jay Street, Bldg 54800
Cape Canaveral AFS, FL 32920
 - (2) Aerospace Fuels Laboratory (FP2075)
OL Det 3, WR-ALC/AFTLE
1747 Utah Ave, Bldg 6670
Vandenberg AFB, CA 93437-5220
- d. To ensure timely arrival of samples at the laboratory, the Traffic Management Office (TMO) shall be requested to prepare required forms for shipment and recommend that the appropriate priority

and Required Delivery Date (RDD) for shipment available to the shipping activity be assigned. As a minimum, an Issue Priority Designator (IPD) 03/Transportation Priority (TP) 1 is authorized for shipments to the Aerospace Fuels Laboratories. The servicing organization shall coordinate with the TMO to ensure that an appropriate priority is assigned and that everything is in order for expeditious shipment of the samples.

- e. The sampling activity shall notify the laboratory of sample shipment by fax, e-mail, or message. See AFDIR 37-135.

4.12 USE LIMITS.

<u>Component or Contaminant</u>	<u>Percent by Weight</u>
Hydrazine	67 – 70
Water	30 – 33
Chloride	0.0006 max
Nonvolatile Residue	0.006 max
Iron	0.004 max
Carbon Dioxide	0.01 max
Other Volatile Carbonaceous Material (MMH, UDMH Alcohol)	0.05 max

4.13 TESTS.

Samples shall be analyzed using the methods of MIL-PRF-87930.

4.14 TEST REPORTS.

The laboratory shall complete a test report for each sample. All information on the AFTO Form 475 shall be transferred to this form. The laboratory shall retain one copy, send one copy to Det 3, WR-ALC/AFTT, 2430 C St, Bldg 70, Area B, Wright-Patterson AFB, OH 45433-7632, and send one copy to the submitting activity.

Table 4-1. Sampling Equipment and Materials

Nomenclature	P/N and NSN	Application
Sampling Kit, Hydrazine	16A2327-1/NSN 6695-01-111-4769	Take H-70 samples
Detergent	SPARKL/NSN 6515-00-371-2779 or Equivalent	Clean sampling equipment
Bag, Plastic, 12x18 inches	A-A-1246/NSN 8105-00-721-9913	Packaging for sampling equipment
<p style="text-align: center;">NOTE</p> <p>The package below contains a 16 oz amber plastic-coated bottle with PTFE closure; 4G double-wall fiberboard carton; metal containers that have passed internal pressure tests for liquids; 4 mil polybag; and pressure sensitive tape; vermiculite blanket and pillows.</p>		
Packaging, Hazardous Materials	Fisher Scientific, P/N 03-523-8/NSN 6530-01-460-8369	Ship H-70 samples
Sponge, Surgical (Gauze Pads)	DDD-P-54/NSN 6510-00-901-5428	Wipes for H-70
Pen, Felt Tip	Fisher Scientific, P/N 15-183-10/NSN 7520-01-467-2220	Marking glass sample bottles
Cylinder, Graduated, Laboratory, 500 mL	MS35943-9/NSN 6640-00-420-2000	Calibrating glass sample bottles

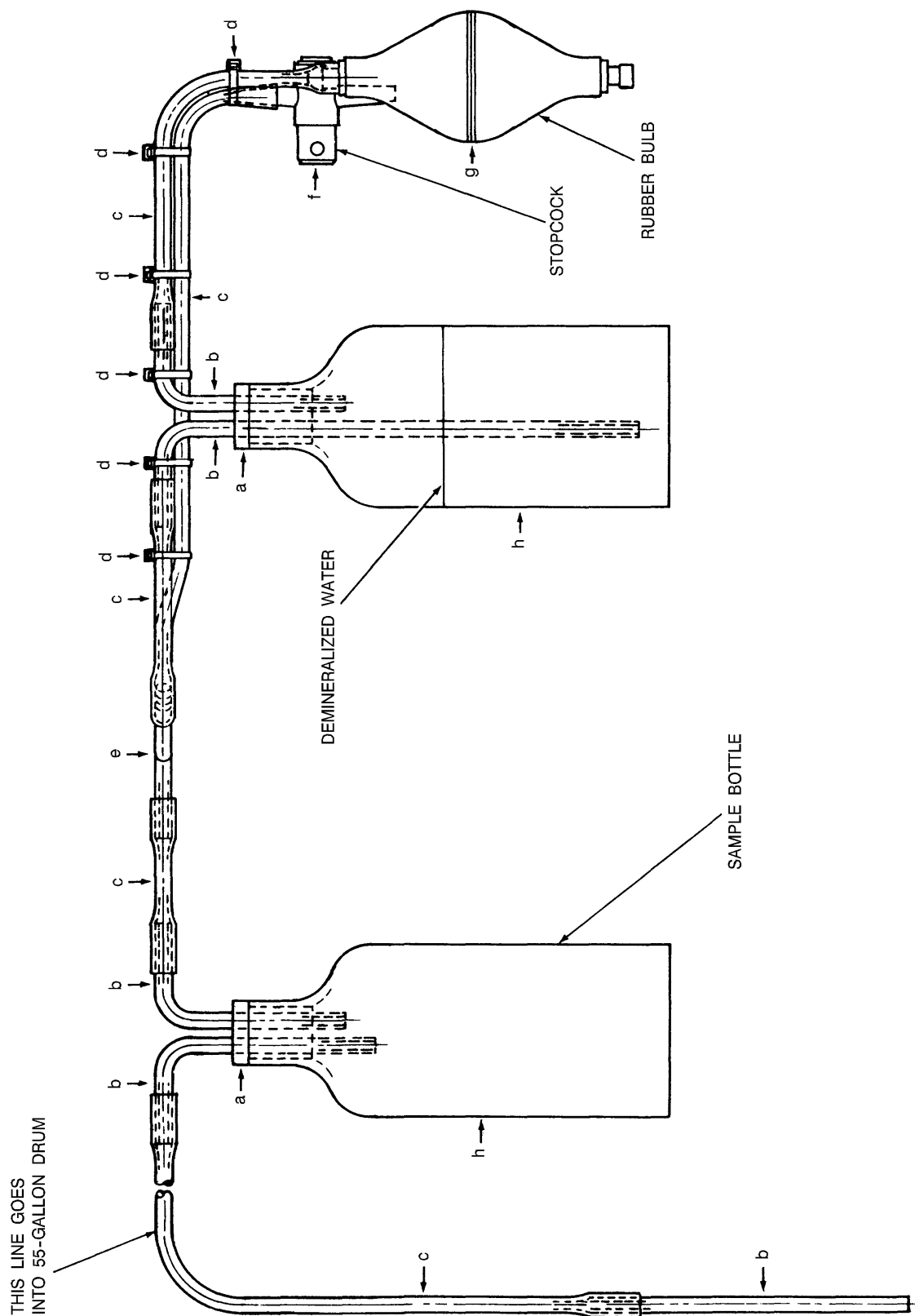


Figure 4-1. Hydrazine Sampling Apparatus